REPORT NO. 76-2-15

JULY 1976
3400

ANTHRACNOSE OF YELLOW-POPLAR (*LIRIODENDRON TULIPFERA* L.) CAUSED BY *GLOMERELLA CINGULATA* (St.) S.&v.S. AT A MISSISSIPPI STATE FOREST NURSERY

U. S. FOREST SERVICE
Pineville, Louisiana

U. S. DEPARTMENT OF AGRICULTURE -- FOREST SERVICE
SOUTHEASTERN AREA, STATE AND PRIVATE FORESTRY
FOREST INSECT AND DISEASE MANAGEMENT GROUP

REPORT NO. 76-2-15

JULY 1976
3400

ANTHRACNOSE OF YELLOW-POPLAR (*LIRIODENDRON TULIPIFERA* L.) CAUSED BY *GLOMERELLA CINGULATA* (St.) S.&v.S. AT A MISSISSIPPI STATE FOREST NURSERY

by

C. E. Affeltranger[1/] and R. J. Collins[2/]

ABSTRACT

A foliar disease of yellow-poplar (Liriodendron tulipifera *L.) was determined to be anthracnose caused by* Glomerella cingulata *(St.) S.&v.S. following greenhouse pathogenicity tests. A limited field survey at a Mississippi state forest nursery revealed a reduced incidence (average-3.3 percent) of the disease on well-drained beds. Incidence (average - 12.9 percent) was consistently higher where bed drainage was intermediate to poor.*

Outbreaks of a foliar disease on yellow-poplar (*Liriodendron tulipifera* L.) from an unknown cause had occurred at a state forest nursery near Winona, Mississippi for the past 6 years according to the nursery superintendent. Losses in 1975 amount to 20 percent of the crop, or 31,000 seedlings. Diseased specimens collected in October 1974 yielded only *Alternaria* sp. Nees. Because this problem is recurrent and losses of seedlings are sizable, further investigation was warranted.

MATERIALS AND METHODS

Field samples were taken in July, September, and October 1975. The two fungi most consistently isolated were *Alternaria* sp. and *Glomerella cingulata** (St.) S.&v.S. Both were isolated from the midribs and petioles as well as from the leaf proper. The two fungi were subsequently used in pathogenicity tests.

1/ Plant Pathologist, Forest Insect and Disease Management, U.S. Forest Service, State and Private Forestry, Pineville, Louisiana 71360.

2/ Plant Pathologist, Mississippi Forestry Commission, Jackson, Mississippi 39201.

* Identification by Dr. R. J. Stipes, Plant Pathologist, Virginia Polytechnic Institute, Blacksburg, Virginia.

Greenhouse Pathogenicity Tests -

In the greenhouse, yellow-poplar seedlings were potted in a medium consisting of soil, bark, and pine needles. Before and after inoculations, the seedlings were covered with plastic bags which, hopefully, cause the stomates to open, thus predisposing the seedlings to infection.

Both *Alternaria* sp. and *G. cingulata* were grown on fresh potato dextrose agar plates until sporulation began. An aqueous conidial (spore) suspension was then obtained and applied to the upper and lower surfaces of the leaves with a chromatography spray gun.

There were three separate pathogenicity tests - one with *Alternaria* sp. and two with *G. cingulata*. The particular conditions applicable to all three will be stated separately.

With the test involving *Alternaria* sp., eight seedlings were inoculated. These were covered with plastic bags 0 to 7 days before and 6 days after inoculation. Inoculum concentrations varied from 50,000 to 150,000 spores per milliliter (ml). Volume applied to each seedling was 3 to 4 ml.

In the first test involving *G. cingulata,* 10 seedlings were used. These were bagged 5 to 9 days before and 5 to 9 days after inoculation. Inoculum concentration varied from 700,000 to 950,000 spores per ml. Five ml were applied to each seedling.

In the second test, 17 seedlings were inoculated and 17 were maintained as controls (no inoculation or bagging). Bagging took place 2 to 19 days before and 0 to 5 days after inoculation. Inoculum concentration varied from 200,000 to 1,700,000 spores per ml. Approximately 3 to 5 ml were applied to each seedling.

Field Observations -

Data on total seedlings and seedlings with top symptoms of foliar disease were taken on plots 4 feet by 24 feet. Three sampling areas (1 foot by 4 feet) were taken on the plots. A total of six plots placed diagonally across six beds were examined on July 29, September 3, and October 30, 1975.

RESULTS

Greenhouse Pathogenicity Tests -

Symptoms did not appear on seedlings inoculated with *Alternaria* sp.

In the first test with *G. cingulata* in 9 to 14 days after inoculation, seven of the 10 seedlings developed symptoms.

Initially, brown stippling appeared, then brown blotching, discoloration, and finally, defoliation. Only one of the seven seedlings leafed out again. It has become reinfected. Fifty-six tissue cultures were taken from the symptomatic seedlings and 42 (75.0 percent) isolates of *G. cingulata* were obtained. *G. cingulata* was isolated from every symptomatic seedling.

Symptoms did not develop on the 17 control seedlings in the second test. Degree of symptom development varied in inoculated seedlings in the second test. Some developed only brown stippling, while others had discoloration and leaf drop as well. Eight of 17 inoculated seedlings were symptomatic seedlings. Of 72 tissue cultures 57 (79.2 percent) colonies of *G. cingulata* were obtained.

Field Observations -

By mid-July 1975, blotching, discoloration, and defoliation of yellow-poplar leaves appeared in the nursery beds at Winona. In some seedlings, mortality occurred. Root observation revealed no necrosis.

Table 1 reveals data in the form of percentages of seedlings with top symptoms for July 29, September 3, and October 30, 1975.

Table 1. Percentages of yellow-poplar seedlings with top symptoms of an anthracnose caused by *Glomerella cingulata* (St.) S.&v.S. at Winona State Forest Nursery, Winona, Mississippi in 1975.

	Bed Number						
	1	2	3	4	5	6	Average
July 29	18.0	6.1	6.7	0.0	1.7	28.6	8.0
Sept 3	3.8	20.0	0.0	6.4	0.0	16.0	7.0
Oct 30	9.5	13.2	11.1	7.7	2.0	19.5	9.6
Average	10.7	12.6	5.5	4.5	1.1	21.1	8.1

Rough field observations revealed that infection (average - 3.3 percent) was lowest where beds (4 and 5) were well-drained. Infection (average - 10.1 percent) increased in beds (1 to 3, inclusive) that were poorly-drained. Highest infection (21.1 percent) occurred in a bed (6) that was intermediate in drainage. Average incidence of infection was 12.9 percent when intermediate and poorly-drained beds were combined. Overall infection varied little between the three dates of observations.

DISCUSSION

A possible explanation for the lack of total success with *G. cingulata* inoculation is the heat buildup which occurred under the bags used to predispose the seedlings. Much heat damage to leaves, particularly in the second test, was in evidence on the inoculated seedlings. Nevertheless, the recovery rates of *G. cingulata* from seedlings inoculated with the same indicates that it is pathogenic on yellow-poplar as Ito and Kobayashi (1962) first indicated. Pathogenicity was maintained in all tests by using recent isolations from diseased material for spore suspensions rather than using transfers from stock cultures. *Alternaria* sp. was not found to be pathogenic in the field[3/] as well as in this report. Test applications of protective fungicides to control the problem are being tried by nursery personnel of the Mississippi Forestry Commission.

Rough field observations taken may indicate that this disease is disfavored by dry conditions.

SUMMARY

Similar symptoms on yellow-poplar in the greenhouse and the field and the high recovery rate of *G. cingulata* following greenhouse inoculation indicate that the yellow-poplar problem at the Winona State Nursery in Mississippi is anthracnose caused by *G. cingulata*.

LITERATURE CITED

Ito, Kazuo, and Kobayashi, Takao. 1962. Studies on some anthracnoses of woody plants - VII. Anthracnose fungus of yellow-poplar. Govt. For. Exp. Sta., Tokyo, Japan. Bull. 146, 11 p.

3/ Written communication with Dr. T. H. Filer, Project Leader, Southern Forest Experiment Station, Stoneville, Mississippi.